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Attorney Docket No. 0884

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Number : 6,706,951 B1
Issued : March 16, 2004
Name of Patentee : Pioneer Hi-Bred International, Inc.
Title of Invention : A Maize Nucleic Acid Encoding a GDP-Mannose
Pyrophosphorylase

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Certificate
JUN 04 2004
of Correction

**REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT
FOR PTO MISTAKE (37 CFR 1.322(a))**

1. Attached, in duplicate, is Form PTO/SB/44, with at least one copy being suitable for printing.
2. The errors in the application file are:
 - a) Inventors: Petition to delete inventors Xun Wang and Benjamin A. Bowen was filed 10/11/2001 (copy attached). Inventors were deleted per Office Action mailed 01/02/2002 (copy attached). Therefore, the only remaining inventor who should be listed on the patent is Kanwarpal S. Dhugga.
 - b) Abstract: The abstract was amended by Examiner's Amendment mailed 10/24/2003 with the Notice of Allowance (copy attached). Published patent does not accurately reflect this amendment. Both the original Abstract that was deleted and the new Abstract are printed in the published patent.
3. Please send the Certificate to:

Name Kathryn K. Lappegard
Address: Pioneer Hi-Bred International, Inc.
Corporate Intellectual Property

JUN 07 2004

Patent No. 6,706,951 B1
Attorney Docket No. 0884

7100 N.W. 62nd Avenue
P.O. Box 1000
Johnston, Iowa 50131-1000

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Kathryn K. Lappegard', written in a cursive style.

Kathryn K. Lappegard
Agent for Applicant(s)
Registration No. 46,857

PIONEER HI-BRED INTERNATIONAL, INC.
Corporate Intellectual Property
7100 N.W. 62nd Avenue
P.O. Box 1000
Johnston, Iowa 50131-1000
Phone: (515) 253-5707
Facsimile: (515) 334-6883

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**Certificate of Mailing under 37 CFR 1.8**

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

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on May 25, 2004

Date

Signature

Kathryn K. Lappegard

Typed or printed name of person signing Certificate

Note: Each paper must have its own certificate of mailing, or this certificate must identify each submitted paper.

- 1) Request for Certificate of Correction of Patent for PTO Mistake /2 Pages (1 copy)
- 2) Certificate of Correction /1 Page (2 copies)
- 3) Copy of Petition and Fee Deleting Correctly Named Persons Who are Not Inventors of Invention Now Being Claimed Filed 10/07/2001 /2 Pages (1 copy)
- 4) Copy of Office Action Mailed 01/02/2002 Acknowledging Receipt of Petition to Delete Inventors /13 Pages (1 copy)
- 5) Copy of Notice of Allowance w/Examiner's Amendment Mailed 10/24/2003 Amending Abstract /8 Pages (1 copy)

This collection of information is required by 37 CFR 1.8. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.8 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO : 6,706,951 B1

DATED : March 16, 2004

INVENTOR(S) : Kanwarpal S. Dhugga

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the title page, Item (75) and Column 1:

(75) Inventors: Kanwarpal S. Dhugga, Johnston, IA (US)

On the title page, Item (57) and Column 2:


(57) ABSTRACT

A nucleic acid encoding a GDP-mannose pyrophosphorylase from maize is taught, as are plants and plant cells tranformed with it.

MAILING ADDRESS OF SENDER: Pioneer Hi-Bred International, Inc.
7100 N.W. 62nd Avenue
P.O. Box 1000
Johnston, IA 50131-1000

PATENT NO. 6,706,951 B1

No. of additional copies

 Page 1 of 1

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO : 6,706,951 B1

DATED : March 16, 2004

INVENTOR(S) : Kanwarpal S. Dhugga

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On the title page, Item (75) and Column 1:

(75) Inventors: Kanwarpal S. Dhugga, Johnston, IA (US)

On the title page, Item (57) and Column 2:

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A nucleic acid encoding a GDP-mannose pyrophosphorylase from maize is taught, as are plants and plant cells tranformed with it.

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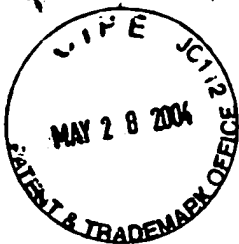
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 Page 1 of 1

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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CERTIFICATE OF MAILING

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST-CLASS MAIL IN AN ENVELOPE ADDRESSED TO: ASSISTANT COMMISSIONER FOR PATENTS, WASHINGTON, D.C. 20231, ON OCTOBER 4, 2001

Kathryn R. Rappaport
AGENT/ATTORNEY FOR APPLICANT

October 4, 2001
DATE

Attorney Docket No. 0884

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Dhugga et al. Date: October 4, 2001
Serial No.: 09/374,967 Group Art Unit: 1635
Filed: August 16, 1999 Examiner: Schmidt, M.
For: Compositions and Methods for Manipulating Gum Production in Plants

Assistant Commissioner for Patents
Washington, D.C. 20231

AMENDMENT, PETITION AND FEE DELETING CORRECTLY
NAMED PERSON(S) WHO ARE NOT INVENTOR(S) OF INVENTION
NOW BEING CLAIMED -NONPROVISIONAL APPLICATION-
(37 C.F.R. § 1.48(b))

1. This amendment and petition under 37 C.F.R. § 1.48(b) is to delete the names of the following persons named as inventors and who are not the inventors of the invention now being claimed: Xun Wang and Benjamin A. Bowen.
2. Claim(s) Now on File
(check and complete all applicable items)
 - ☒ originally filed claim(s) 1-10, 12-14, 23, 24, 32, 33, 41-45, 49-55, 57-59 and 67-71.
 - ☒ originally filed claim(s) 11, 56, 65, 66 and 73, as amended on October 4, 2001.
 - ☒ claim(s) 76 filed on October 4, 2001.

Serial No. 09/374,967

Group Art Unit: 1635

☐ claim(s) _____
filed on _____, as amended on _____.

3. Status of Inventorship After Amendment

(check the following item if the inventor(s) remaining after the petition and amendment is accepted are not the inventor(s) of the subject matter of all the claim(s) now being claimed).

☐ Attached is an explanation of the facts, including the ownership of the claim(s) at the time the last claimed invention was made (Declaration of Inventorship and Common Ownership of Claims in application).

4. Fee (37 C.F.R. § 1.17(i) - \$130.00)

The fee required is paid as follows:

☐ Attached is a ☐ check ☐ money order in the amount of \$ _____.

☒ Authorization is hereby made to charge the amount of \$130.00 to Deposit Account No. 16-1852.

☒ Charge any additional fees required by this paper or credit any overpayment in the manner authorized above.

A duplicate of this paper is attached.

Respectfully submitted,



Kathryn K. Lappegard
Agent for Applicant(s)
Registration No. 46,857

PIONEER HI-BRED INTERNATIONAL, INC.

Corporate Intellectual Property

7100 N.W. 62nd Avenue

P.O. Box 1000

Johnston, Iowa 50131-1000

Phone: (515) 253-5707

Facsimile: (515) 334-6883



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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
07/74,967	08/16/1999	KANWARPAL S. DHUGGA	5718-55	4392

PIONEER HI-BRED INTERNATIONAL INC.
7100 N.W. 62ND AVENUE
P.O. BOX 1000
JOHNSTON, IA 50131

0884

EXAMINER

SCHMIDT, MARY M

ART UNIT	PAPER NUMBER
----------	--------------

1635

DATE MAILED: 01/02/2002 12

JAN 09 2001

4-2-02

7-2-02

Please find below and/or attached an Office communication concerning this application or proceeding.

DOCKETED

JAN 11 2002

Office Action Summary

Application No.

09/374.967

Applicant(s)

DHUGGA ET AL.

Examiner

Mary Schmidt

Art Unit

1635

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14, 23, 24, 32, 33, 41-45, 49-59, 65-71, 73 and 76 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 23, 24, 32, 33, 41-45, 49-59, 65-71, 73 and 76 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other

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DETAILED ACTION

1. The Inventors Xun Wang and Benjamin A. Bowen were deleted from the instant Application upon receipt and entry of the Petition (Paper 11) filed October 9, 2001.

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-14, 23-24, 32-33, 41-45, 49-59, 65-71, 73 and 76 stand rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention for the same reasons of record as set forth in the Official Action mailed 07/05/01.

Applicant's arguments filed 10/09/01 have been fully considered but they are not persuasive.

The claims as amended did not change the scope of the claimed compositions. The rejection is maintained on the grounds argued in the previous Official Action.

Applicant argues that the disclosure in the specification is sufficient to teach that Applicant was in possession of the scope of the claimed constructs at the time the invention was made. Specifically, Applicant argues that the specification taught specific sequences to the maize GDP-mannose pyrophosphorylase, mechanics for hybridization to such sequences, and that such disclosure reasonable conveys to the artisan that the inventor had possession at the time the

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invention was made of sequences which would hybridize to the specifically disclosed sequences. Applicant further cites MPEP 2164.08(b) as teaching that inoperative embodiments within the scope of the claim does not necessarily render a claim nonenabled for that scope. This citation was made in response to the argument that any sequence having 20 nucleotide homology to the disclosed SEQ ID NOS. would not have an expectation of providing a GDP-mannose pyrophosphorylase having the function of such a protein. Applicant thus argues that Applicant was in possession of the scope of the instantly claimed invention at the time the invention was made.

In response, although the specification does teach specific maize GDP-mannose pyrophosphorylase, as well as conditions for hybridization of nucleic acid sequences to the disclosed GDP-mannose pyrophosphorylase sequences, such a disclosure does not reasonably convey to the skilled artisan that Applicant was in possession of the scope of the claimed sequences. As argued previously, despite the ability to hybridize sequences to a known sequence, even for the purpose of identifying sequences with high homology to said sequences, the mere identification of such a sequence does not render the skilled artisan with a nucleic acid sequence which could be considered a GDP-mannose pyrophosphorylase. For instance, as argued previously, any sequence having a 20 base region of homology to the disclosed sequences does not have the expectation that such a sequence would be considered a GDP-mannose pyrophosphorylase by function. Applicant argues that MPEP 2164.08(b) doesn't require all claimed embodiments to be operative. However, whether the claimed sequences are operative or

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not does not render the claimed sequences adequately described. The nucleic acid sequences may be operative, but not considered a maize GDP-mannose pyrophosphorylase. Furthermore, the MPEP states that the standard is "whether a skilled person could determine which embodiments that were conceived, but not yet made, would be inoperative or operative with expenditure of no more effort than is normally required in the art." The references cited in the scope of enablement rejection teach the unpredictability in the art for determination of protein structure/function from knowing a nucleic acid sequences. Even in cases of families of high homology, there are deviant proteins which do not function in a manner similar to the other family members. Thus each protein must be considered on an individual basis. The specification as filed teaches some GDP-mannose pyrophosphorylase sequences, as well as hybridization conditions for detection of nucleic acids which would hybridize the disclosed nucleic acid sequences, does not provide sufficient guidance to determine which of such sequences would be considered a GDP-mannose pyrophosphorylase. Thus, the specification as filed does not teach that Applicant was in possession of any plant GDP-mannose pyrophosphorylase; sequences having 20 contiguous nucleotides of SEQ ID NO:1; sequences having 90% homology to any plant GDP-mannose pyrophosphorylase, SEQ ID NO:2, SEQ ID NO:1 or any 20 contiguous nucleotides of SEQ ID NO:1; any sequence that hybridizes to any of those sequences, or any antisense, fragment or variant of any of such sequences.

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4. Claims 1-14, 23-24, 32-33, 41-45, 49-59, 65-71, 73 and 76 stand rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for SEQ ID NOS:1 and 2, expression cassettes comprising said sequences, plant cells and transgenic plants comprising said sequences, methods of expressing said sequences or antisense to said sequences in a plant cell or plant, does not reasonably provide enablement for the scope of possible nucleic acid sequences or protein sequences claimed nor use thereof in plant cells or plants. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims for the same reasons of record as set forth in the Official Action mailed 07/05/01.

Applicant's arguments filed 10/09/01 have been fully considered but they are not persuasive.

The claims as amended did not change the scope of the claimed compositions. The rejection is maintained on the grounds argued in the previous Official Action.

Applicant requests on page 11 of the response that "examiner make explicit which claims the statement refers to. Variants and/or amino acid substitutions of the coding region are not claimed in the present invention."

In response, the assertion that there is "little guidance beyond the mere presentation of sequence data to enable one of ordinary skill in the art to determine, without undue experimentation, the positions in the protein which are tolerant to change..." made in the previous Action, is in response to the breadth of claim 1 for instance. Claim 1, step (g), which states "a

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nucleotide sequence encoding an antisense RNA of a nucleotide sequence of a), b), c), d), e) or f); and fragments and *variants* thereof.” Claim 1 thus discusses variants of a coding region as written. The statement was also in regards to the breadth of the nucleic acid sequences claimed in sections a) through f) of claim 1. Specifically, the asserted utility of the claimed sequences in the specification as filed is the role of the disclosed sequences, maize GDP-mannose pyrophosphorylases as proteins involved in gum production (see page 4, last para., of the specification for instance). The disclosure of the specification does not support or enable the skilled artisan for using other types of proteins. The claims as written broadly read on sequences which comprise variants, fragments, and other sequences which hybridize to the disclosed sequences. However, sufficient guidance is not supplied in the specification to teach one skilled in the art how to make other nucleic acid sequences, even by hybridization, which would be considered to make a maize GDP-mannose pyrophosphorylase having the disclosed utility. As such, one skilled in the art would necessarily practice “trial and error” experimentation beyond the disclosure to take any such sequence having the capacity to hybridize to the disclosed sequences and generating a functional maize GDP-mannose pyrophosphorylase as enabled in the instant disclosure.

With regard to the question about where the specification teaches screening for active muteins, this instant specification does not specifically use the word “muteins.” For clarification, the intended point of this assertion in the prior Action was that the specification teaches particular sequences (SEQ ID NO:1 as the nucleic acid which encodes the protein in SEQ ID NO:2) and not

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variants of such sequences. For instance, the broadly claimed sequences read on any sequence which hybridizes to SEQ ID NO:1, thus encompassing variants of it, and variants of the disclosed protein in SEQ ID NO:2. Such variants encompass sequences having different regions from the specifically disclosed sequences such as muteins. It is argued that such sequences as broadly claimed are not enabled by the instant disclosure. Although the specification teaches methods of hybridizing to SEQ ID NO:1 for instance to determine other potential GDP-mannose pyrophosphorylases and references to teach how to align such sequences to known sequences in the art to determine the homology of the identified sequences (see page 12 of the specification for instance), the ability to find homologous regions in a new protein to known proteins does not enable one skilled in the art to use such as protein for the reasons argued previously.

Applicant argues on page 13 of the response that a majority of the sequences claimed in claim 1 would be functional. As argued in the prior Action and above, the claims read on a broad scope of sequences which hybridize to the disclosed, sequences, or are just generally considered plant GDP-mannose pyrophosphorylases. The claims read on sequences having more breadth than those which have 90% homology to SEQ ID NO:1. Applicant points to an amino acid sequence homology comparison between GDP-mannose pyrophosphorylases from different organisms showing regions of significant homology between the GDP-mannose pyrophosphorylases. At the time the invention was made however, not all of the disclosed sequences argued in the response were available and thus one skilled in the art would not have known at the time the invention was made that a certain scope of GDP-mannose

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pyrophosphorylases had certain regions of high homology. Additionally, there is a high level of unpredictability that any sequence which has a 20 base pair contiguous region of SEQ ID NO:1 or any antisense, fragments or variants as broadly claimed would function as a GDP-mannose phosphorylase, or to inhibit such a gene as broadly claimed. To design a functional antisense, the exact target sequence must be known. Furthermore, specific regions of the target sequence must be known to be capable of binding an antisense oligonucleotide since not all regions of the gene are accessible to antisense binding due to steric hindrance. For the reasons summarized above and stated in the previous Official Action, the claims as written lack enablement to make and use the scope of the claimed sequences.

Due to the lack of guidance in the specification or the art for making and using the scope of the claimed sequences, one skilled in the art would necessarily practice an undue amount of experimentation to make and use the invention as claimed.

5. Claims 56-59 stand rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention for the same reasons of record as set forth in the Official Action mailed 07/05/01.

Applicant's arguments filed 10/09/01 have been fully considered but they are not persuasive.

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Applicant first argues that the DeLuca reference “offers no less than eleven examples of success in altering metabolic pathways in plants via transformation with exogenous genes... page 225N, paragraph 5; page 226N, paragraph 2; page 227N, paragraphs 2, 3, 4, 5, 7 and 10; and page 228N, paragraphs 2, 3, and 4.”

Paragraph 5 on page 225N discusses changing flower color in plants. The cited paragraphs on pages 226N, 227N and 228N teach examples in the art for different types of changes in enzyme concentration. However, none of the cited examples are considered to provide a direct nexus to one skilled in the art as to how to use the scope of claimed sequences for any gum manipulation (both increasing and decreasing) as broadly claimed. DeLuca is relied on primarily to teach the “numerous empirical *attempts*”, not successes, “to redirect metabolic pathways.” They teach specifically that “in some cases spectacular results are obtained, whereas on many occasions desired goals have been impossible to achieve. Several reasons could be invoked for a particular failure... but most of the answers will involve detailed analyses of the targeted biochemical pathways and their transgenic counterparts. The results from these types of experiments should serve to develop more rational approaches to metabolic engineering of plants.” (P. 228N) Thus, while Applicant is correct that several examples are taught by DeLuca for success in different types of metabolic engineering, none of these examples is considered to correlate to the claimed metabolic pathway changes, and DeLuca clearly states that on “many occasions” results are not predictable.

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Stephanopoulous et al. is further relied upon to teach on page 395, col. A, that “in summary there are three outstanding challenges in metabolic engineering from a network analysis point of view: (1) locating the critical branch points in the bioreaction network; (2) selecting the most appropriate type of genetic modification; (3) identifying the location(s) of metabolic control as target(s) of further manipulation.” Neither the specification nor the art has provided guidance as to these unpredictable factors in design of methods for gum manipulation as broadly claimed. Note that U.S. Patent 6,363,669, exemplifies different ratios of xanthan gum weights as well as other types of gums such as guar gum, tamarind gum and bean gum. Neither the specification nor the art taught one skilled in the art at the time the invention was made how to correlate any manipulation of the claimed sequences for downstream manipulation of any gum production as broadly claimed. Specifically, there was no guidance for the unpredictable factors cited by Stephanopoulous et al. for the instantly claimed metabolic pathways prior to the time the invention was made. In the absence of such teaching, one skilled in the art would have necessarily practiced “trial and error” experimentation to practice the claimed invention.

Finally, although Ritter et al. taught the role of GDP-mannose generically in the production of sugars to form oligosaccharides, such a disclosure does not overcome the unpredictability in the art of engineering specific plant metabolic pathways taught by DeLuca and Stephanopoulous et al. above. As such, one skilled in the art would necessarily practice undue experimentation to make and use the invention as broadly claimed.

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6. The claims remain free of the prior art since the art does not teach sequences of plant GDP-mannose pyrophosphorylase as claimed prior to the filing of the instant invention.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

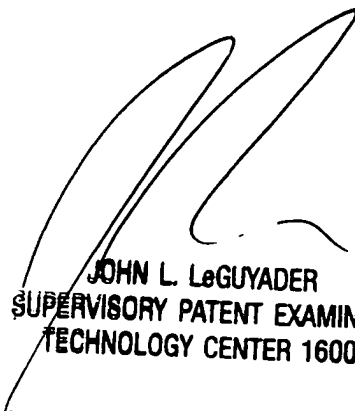
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 1635

Any inquiry concerning this communication or earlier communications from the examiner should be directed to *Mary M. Schmidt*, whose telephone number is (703) 308-4471.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, *John LeGuyader*, may be reached at (703) 308-0447.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Analyst, *Katrina Turner*, whose telephone number is (703) 305-3413.



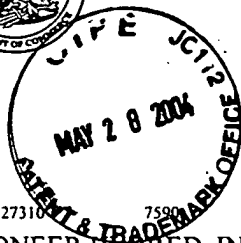
JOHN L. LeGUYADER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600

M. M. Schmidt
December 31, 2001



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov



NOTICE OF ALLOWANCE AND FEE(S) DUE

27310 7590 10/24/2003
PIONEER HI-BRED INTERNATIONAL INC.
7100 N.W. 62ND AVENUE
P.O. BOX 1000
JOHNSTON, IA 50131

OCT 27 2003

DOCKETED

EXAMINER

KUBELIK, ANNE R

ART UNIT PAPER NUMBER

1638

DATE MAILED: 10/24/2003

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/374,967	08/16/1999	KANWARPAL S. DHUGGA	5718-55 0884	4392

TITLE OF INVENTION: COMPOSITIONS AND METHODS FOR MANIPULATING GUM PRODUCTION IN PLANTS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1330	\$0	\$1330	01/26/2004

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status.
See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/374,967	08/16/1999	KANWARPAL S. DHUGGA	5718-55	4392

27310 7590 10/24/2003
PIONEER HI-BRED INTERNATIONAL INC.
7100 N.W. 62ND AVENUE
P.O. BOX 1000
JOHNSTON, IA 50131

EXAMINER

KUBELIK, ANNE R

ART UNIT PAPER NUMBER

1638

DOCKETED

DATE MAILED: 10/24/2003

Determination of Patent Term Extension under 35 U.S.C. 154 (b) (application filed after June 7, 1995 but prior to May 29, 2000)

The Patent Term Extension is 0 day(s). Any patent to issue from the above-identified application will include an indication of the 0 day extension on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Extension is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/374.967	08/16/1999	KANWARPAL S. DHUGGA	5718-55	4392
27310	7590	10/24/2003	EXAMINER	
PIONEER HI-BRED INTERNATIONAL INC. 7100 N.W. 62ND AVENUE P.O. BOX 1000 JOHNSTON, IA 50131			KUBELIK, ANNE R	
			ART UNIT	PAPER NUMBER
			1638	

DATE MAILED: 10/24/2003

Notice of Fee Increase on October 1, 2003

If a reply to a "Notice of Allowance and Fee(s) Due" is filed in the Office on or after October 1, 2003, then the amount due will be higher than that set forth in the "Notice of Allowance and Fee(s) Due" since there will be an increase in fees effective on October 1, 2003. See Revision of Patent Fees for Fiscal Year 2004; Final Rule, 68 Fed. Reg. 41532, 41533, 41534 (July 14, 2003).

The current fee schedule is accessible from (<http://www.uspto.gov/main/howtofees.htm>).

If the fee paid is the amount shown on the "Notice of Allowance and Fee(s) Due" but not the correct amount in view of the fee increase, a "Notice of Pay Balance of Issue Fee" will be mailed to applicant. In order to avoid processing delays associated with mailing of a "Notice of Pay Balance of Issue Fee," if the response to the Notice of Allowance is to be filed on or after October 1, 2003 (or mailed with a certificate of mailing on or after October 1, 2003), the issue fee paid should be the fee that is required at the time the fee is paid. If the issue fee was previously paid, and the response to the "Notice of Allowance and Fee(s) Due" includes a request to apply a previously-paid issue fee to the issue fee now due, then the difference between the issue fee amount at the time the response is filed and the previously-paid issue fee should be paid. See Manual of Patent Examining Procedure, Section 1308.01 (Eighth Edition, August 2001).

Effective October 1, 2003, 37 CFR 1.18 is amended by revising paragraphs (a) through (c) to read as set forth below.

Section 1.18 Patent post allowance (including issue) fees.

- (a) Issue fee for issuing each original or reissue patent, except a design or plant patent:
- By a small entity (Sec. 1.27(a))..... \$665.00
 - By other than a small entity..... \$1,330.00
- (b) Issue fee for issuing a design patent:
- By a small entity (Sec. 1.27(a))..... \$240.00
 - By other than a small entity..... \$480.00
- (c) Issue fee for issuing a plant patent:
- By a small entity (Sec. 1.27(a))..... \$320.00
 - By other than a small entity..... \$640.00

Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

Notice of Allowability

Application No.

09/374,967

Examiner

Anne R. Kubelik

Applicant(s)

DHUGGA ET AL.

Art Unit

1638

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 09/26/03.
2. ☒ The allowed claim(s) is/are 5, 9-10, 12, 23, 32, 41-44, 77 and 79-80, renumbered claims 4-13, 1, 3, 2 respectively.
3. ☒ The drawings filed on _____ are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.
5. ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No. _____.
 - (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
 - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet.

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1 <input type="checkbox"/> Notice of References Cited (PTO-892) | 2 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 4 <input checked="" type="checkbox"/> Interview Summary (PTO-413), Paper No. _____ |
| 5 <input type="checkbox"/> Information Disclosure Statements (PTO-1449), Paper No. _____ | 6 <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 7 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | 8 <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9 <input type="checkbox"/> Other |

Examiner's Amendment

1. An extension of time under 37 CFR 1.136(a) is required in order to make an examiner's amendment that places this application in condition for allowance. During a telephone conversation conducted on 10 October 2003, Kathryn Lappegard requested an extension of time for 1 MONTH(S) and authorized the Commissioner to charge Deposit Account No. 16-1852 the required fee of \$400 for this extension and authorized the following examiner's amendment. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

IN THE CLAIMS:

In claim 5, "a" in line 1 was replaced with --the--.

In claim 42, "monocot" in line 1 was replaced with --plant--.

In claim 44, "dicot" in line 1 was replaced with --plant--.

In claim 77, in line 1, "selecting" was replaced with --selected-- and in part (b), "a" was replaced with --the--.

Claim 79 (amended) [The] An isolated nucleotide sequence [of claim 77 wherein the nucleotide sequence] that encodes the amino acid sequence of SEQ ID NO:2.

In claim 80, a comma was inserted after "77".

Art Unit: 1638

IN THE ABSTRACT:

[The invention relates to the genetic manipulation of plants, particularly to the expression of galactomannan biosynthetic genes in transformed plants. Nucleotide sequences for the GDP-mannose pyrophosphorylase genes and methods for their use are provided. The sequences find use in the production of gum in plants.]

A nucleic acid encoding a GDP-mannose pyrophosphorylase from maize is taught, as are plants and plant cells transformed with it.

IN THE TITLE:

[COMPOSITIONS AND METHODS FOR MANIPULATING GUM PRODUCTION IN PLANTS]

A MAIZE NUCLEIC ACID ENCODING A GDP-MANNOSE PYROPHOSPHORYLASE

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anne R. Kubelik, whose telephone number is (703) 308-5059. The examiner can normally be reached Monday through Friday, 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson, can be reached at (703) 306-3218. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Customer Service at (703) 308-0198.

Anne R. Kubelik, Ph.D.
October 10, 2003



AMY J. NELSON, PH.D.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600

Interview Summary	Application No.	Applicant(s)	
	09/374,967	DHUGGA ET AL.	
	Examiner	Art Unit	
	Anne R. Kubelik	1638	

All participants (applicant, applicant's representative, PTO personnel):

(1) Anne R. Kubelik. (3)_____.

(2) Kathryn Lappegard. (4)_____.

Date of Interview: 10 October 2003.

Type: a) ☒ Telephonic b) ☐ Video Conference
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☐ No.
If Yes, brief description: _____.

Claim(s) discussed: all.

Identification of prior art discussed: _____.

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicant approved Examiner's amendments to the claims, title and abstract.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiner's Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner.
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.